



GEOCHEMISTRY

162

A Translation of

ГЕОХИМИЯ

A translation of the journal of the Academy of Sciences, U.S.S.R.,
devoted to geochemistry

A publication of the Geochemical Society,
supported financially by a grant from the
National Science Foundation.

Translation Editor Earl Ingerson
Managing Editor E. Wm. Heinrich

Editorial Assistant: Margaret N. Everett
Board of Associate Editors: Leason H.
Adams, F. R. Boyd, Paul E. Damon, Michael
Fleischer, Jack Green, E. P. Henderson,
T. S. Lovering, Duncan McConnell,
A. O. Nier, Jack Vallentyne, D. E. White.

Subscription Prices

Volumes for 1956, 1957, 1958	
Per year (eight issues)	\$20.00
To members of the Geochemical Society and to educational institutions	\$10.00

Subscriptions should be addressed to the
Geochemical Society and sent to

Prof. E. Wm. Heinrich
Mineralogical Laboratory
University of Michigan
Ann Arbor, Michigan

Officers of the Society, 1959

Councilors

John F. Schairer, President
Geophysical Laboratory
Washington 8, D. C.

John A. S. Adams, 1957-1959
The Rice Institute
Houston 1, Texas

T. F. W. Barth, Vice-President
Mineralogisk Museum
Oslo 45, Norway

Alfred O. Nier, 1957-1959
University of Minnesota
Minneapolis 14, Minnesota

Konrad B. Krauskopf, Secretary
Department of Geology
Stanford University, California

E. F. Osborn, 1958-1960
Pennsylvania State University
University Park, Pennsylvania

George T. Faust, Treasurer
U. S. Geological Survey
Washington 25, D. C.

H. G. Thode, 1958-1960
McMaster University
Hamilton, Ontario

Farrington Daniels, Past President
University of Wisconsin
Madison 6, Wisconsin

F. G. Houtermans, 1959-1961
University of Bern
Bern, Switzerland

A. E. J. Engel, 1959-1961
California Institute of Technology
Pasadena 4, California

THE GEOCHEMICAL SOCIETY

Membership: Membership in the Society is open to those qualified to advance the object of the Society—"To encourage the application of chemistry to the solution of geological and cosmological problems." Applicants should indicate whether they desire their membership to begin with the current year or the year following. The annual dues of \$2.00 are to be paid with the application. Checks should be made payable to The Geochemical Society, and sent to K. B. Krauskopf, Geology Department, Stanford University, California. In addition to receiving *The Geochemical News*, members may benefit greatly by reduced subscription rates to this translated journal and to *Geochimica et Cosmochimica Acta*.

The Geochemical News is an informal bi-monthly newsletter published by The Geochemical Society and sent without charge to all of its members. It contains news of the activities of the Society, announcements of forthcoming meetings and symposia of interest to geochemists, announcements of publications and reviews of books of geochemical interest, information on translations, and short articles of general interest in the field of geochemistry.

Subscriptions are available to institutions and organizations at \$2.00 per year. Orders should be sent to the Treasurer, George T. Faust, U. S. Geological Survey, Washington 25, D. C. However, individuals who wish to receive the News can only do so by becoming members of the Society.

Geochimica et Cosmochimica Acta is the official journal of the Geochemical Society. It is an international journal interested in the broad aspects of geochemistry, both geographically and subject-wise; articles have been received from contributors from all of the inhabited continents.

New chemical data and interpretations involving chemical principles are emphasized. For example, papers in chemical mineralogy, petrology, oceanography and volcanology are acceptable, as are those in the chemistry of meteorites, whereas it would be suggested that those in descriptive mineralogy and volcanology, petrography, physical and biological oceanography and physical meteorites, be sent to other journals specializing in these subjects.

Subscription prices are as follows:

To members of The Geochemical Society	\$10.00 per year
To other individual subscribers	\$20.00 per year
To libraries, laboratories, and other institutional subscribers	\$46.50 per year

Orders for subscriptions should be sent to:

Pergamon Press
122 E. 55th Street
New York 19, N. Y.

OR

Pergamon Press, Ltd.
4 Fitzroy Square
London W. 1, England

CONTENTS OF 1958 VOLUME

NO. 1

<i>Starik, I. E., Yu. V. Kuznetsov, S. M. Grashchenko, and M. S. Frenklikh.</i>	
The ionium method of determination of age of marine sediments	1
<i>Savchenko, V. P.</i> The formation of free hydrogen in the earth's crust, as determined by the reducing action of the products of radioactive transformations of isotopes	16
<i>Sidorenko, G. A.</i> X-ray investigations of natural oxides of uranium	26
<i>Marakushev, A. A.</i> Parageneses in boron-bearing magnesium skarns of Taezhnoe deposit in the Archean of the Aldan plate	51
<i>Aleksandrov, I. V., and A. V. Zmeenkova.</i> Evolution of rocks during progressive metamorphism, as exemplified by the Middle Suite of Krivoi Rog Series	62
<i>Bakhmutov, L. A.</i> Distribution of cobalt, nickel, and copper in hydrothermally altered rocks of the Pyshma-Klyuchevskoe deposit	83
<i>Yakhontova, L. K.</i> Experimental studies in oxidation of cobalt and nickel arsenides in solutions containing oxygen and carbonic acid	95
<i>Studenikova, Z. V., and V. A. Zolotareva.</i> Rhenium in molybdenites of the Tyrny-Auz deposit	109
<i>Kosterin, A. V., V. N. Zuev, and I. D. Shevaleevskii.</i> Zr/Hf ratio in zircons in some igneous rocks of northern Kirgizia	116
<i>Znamenskii, E. B.</i> A contribution to geochemistry of titanium in intrusive process of granitic series	120
 Chronicle	
<i>International Conference on Interplanetary Substance. E. L. Krinov</i>	129

NO. 2

<i>Baranov, V. I., and L. A. Kuzmina.</i> The rate of silt deposition in the Indian Ocean	131
<i>Borovik-Romanova, T. F., and E. D. Kalita.</i> Cesium-rubidium microcline- perthite and its rare alkali metal content	141
<i>Slepnev, Yu. S.</i> Some peculiarities in the distribution of lithium and rubidium in certain granitoids of Yakutia	151
<i>Rabinovich, A. V., A. N. Muraveva, and M. V. Zhdanova.</i> Molybdenum content of certain rocks and minerals in the intrusives of Eastern Transbaikal	155
<i>Gavrilova, L. K., and N. V. Turanskaya.</i> Distribution of rare earths in rock- forming and accessory minerals of certain granites	163
<i>Kalenov, A. D.</i> Geochemistry of scandium in the supergene zone	171
<i>Belyakova, E. E.</i> Migration of elements in underground and surface waters of the Upper Kairakty District, Central Kazakhstan	176
<i>Yershova, Z. P., and Ya. I. Olshansky.</i> Equilibrium of two liquid phases in fluor-silicate systems containing alkali metals	189
<i>Marakushev, A. A.</i> Parageneses of lime skarns in the Taezhnoe magnesian skarn iron ore deposit in the Archean of the Aldan Plita	203
<i>Starik, I. E., and L. A. Litvina.</i> Application of the leaching method in eval- uating the suitability of samples for age determinations by the Argon method	213
<i>Zhirov, K. K., N. V. Baranovskaya, and L. A. Litvina.</i> Determination of the absolute geologic age of monazites by the helium method	218

- Katchenkov, S. M., and E. I. Flegontova. Minor elements in the basement rocks of the eastern part of the Russian Platform 224

Chronicle

- The International Conference on Application of Radioactive Isotopes in Research. V. I. Baranov 230
- Symposium on Geochemistry of Rare Elements in Relation to Problems of Petrogenesis. L. V. Tauson 232

NO. 3

- Vinogradov, A. P., E. I. Dontsova, and M. S. Chupakhin. The isotopic composition of oxygen in igneous rocks and meteorites 235
- Krylov, A. Ya. Radioactivity of various rock complexes of the Terskei Ala-Tau Mountains 240
- Smyslov, A. A. Radioactive elements in igneous rocks of northern Kazakhstan 248
- Savul, M. A., and V. V. Pomirleau. The statistical method of determining the homogenization temperature of liquid inclusions 259
- Khitarov, N. I., E. V. Rengarten, and N. E. Lebedeva. Chemical composition of liquid inclusions in Iceland spar and genetic problems 269
- Borisenko, L. F., and N. V. Lizunov. The problem of the relative abundance of scandium in wolframites 279
- Nesterenko, G. V., Z. V. Studenikova, and E. N. Savinova. Rare and dispersed elements in skarns of Tyrny-Auz, Soviet Armenia 287
- Bryzgalin, O. V. The origin of scheelite in skarn ore deposits 297
- Vainshtein, E. E., A. I. Tugarinov, A. M. Tuzova, and I. D. Shevaleevskii. Hafnium-zirconium ratios in metamorphic and metasomatic rocks 305
- Vainshtein, E. E., G. A. Sidorenko, A. I. Tugarinov, and N. V. Turanskaya. Proportions of rare earths in gadolinites 310
- Malyuga, D. P. An experiment in biogeochemical prospecting for molybdenum in Armenia 314
- Fursou, V. Z. Halos of dispersed mercury as prospecting guides at the Achisai lead-zinc deposits 338
- Fedorchuk, V. P. Origin of native mercury 345
- Discussion: D. S. Korzhinskii's conclusions concerning the phase rule. I. V. Alexandrov 353
- Chronicle: Meeting on the 95th Anniversary of the Birth of V. I. Vernadskii. V. I. Gerasimovskii 359

NO. 4

- Gerling, E. K. Effect of metamorphism on geologic age as determined by the lead method 363
- Kazakov, G. A., and N. I. Polevaya. Some preliminary data on elaboration of the post-Precambrian scale of absolute geochronology based on glauconites 374
- Beus, A. A. The role of complexes in transfers and accumulations of rare elements in endogenic solutions 388
- Semenov, E. I., and R. L. Barinskii. The composition characteristics of the rare earths in minerals 398

<i>Borovik-Romanova, T. F., A. F. Sosedko, and E. N. Savinova.</i> The potassium-rubidium ratio in minerals from pegmatites of the Kola Peninsula, as shown by spectrographic analysis	420
<i>Herman, L. D.</i> Geochemical zonations in the Blyava deposit on the western slope of the southern Urals	430
<i>Korolev, D. F.</i> The role of iron sulfides in the accumulation of molybdenum in sedimentary rocks of the reduced zone	452
<i>Vasileva, Z. V.</i> Sulfur-bearing apatites	464
<i>Getling, R. V., and E. N. Savinova.</i> Some data on the boron content of igneous rocks in the Turinsk ore district, Ural Mountains	471
<i>Odikadze, G. L.</i> On the presence of niobium and tantalum in muscovites from pegmatites of the Dzirulsk crystalline massif	479
<i>Gordon, S. A., K. Yu. Volkov, and M. A. Mendovskii.</i> On the forms of germanium in coal	484
<i>Ershov, V. M., and A. I. Shcheglova.</i> Germanium in mine waters of the Kozelov coal basin	490
<i>Mulikovskaya, E. P., and O. N. Tolstikhin.</i> The germanium content of some spring waters in Kamchatka	493

NO. 5

<i>Vinogradov, A. P., Vainshtein, E. E., and Pavlenko, L. I.</i> Tungsten and molybdenum in igneous rocks (as related to the geochemistry of tungsten)	497
<i>Ronov, A. B.</i> Organic carbon in sedimentary rocks (in relation to the presence of petroleum)	510
<i>Dorfman, M. D.</i> Geochemical characteristics of weathering processes in nepheline syenites of Khibina Tundra	537
<i>Voskresenskaya, N. T., and Karpova, I. S.</i> Thallium in ore minerals of the Verkhnyaya Kvaisa	552
<i>Zlobin, B. I.</i> Geochemistry of thallium in alkalic rocks, with Mt. Sandyk Massif (northern Kirgiziya) as an example	560
<i>Semenov, E. I.</i> Relationship between composition of rare earths and composition and structures of minerals	574
<i>Starik, I. E., Starik, F. E., and Mikhailov, B. A.</i> Shifts of isotopic ratios in natural materials	587
<i>Baranov, V. I., Surkov, Yu. A., and Vilenskii, V. D.</i> Isotopic shifts in natural uranium compounds	591
<i>Ivanov, V. V.</i> The fundamental stages of hydrothermal activity of Kamchatka and Kurile Islands volcanoes and the associated types of thermal waters	600
<i>Ginzburg, A. I., Gorzhevskaya, S. A., Erofeeva, E. A., and Sidorenko, G. A.</i> The chemical composition of isometric titanium-tantalum niobates	615
<i>Borodin, L. S.</i> The chemistry of aegirinization and nephelinization of pyroxene in the formation of metasomatic nepheline-pyroxene rocks (ijolites)	637
Discussion: The number of factors of state in systems. <i>D. S. Korzhinskii</i> . .	641
Chronicle: The Seventh Session of the Committee on Determination of the Absolute Age of Geologic Formations. <i>V. I. Baranov and K. G. Knorre</i> . .	646
The Second All-Union Conference on Petrography. <i>N. I. Khitarov</i>	648

NO. 6

<i>Vinogradov, A. P., S. I. Zykov, and L. S. Tarasov.</i> The isotopic composition of admixtures of lead in ores and minerals as indication of their origin and of time of their formation	653
<i>Khitarov, N. I.</i> Problems of petrogenesis in the light of experimental data	664
<i>Gerling, E. K., M. L. Yashchenko, L. K. Levskii, and G. V. Ovchinnikova.</i>	
Determination of age of some micas by the rubidium-strontium method	677
<i>Ovchinnikov, L. N.</i> Determinations of the absolute age of the ore deposits of the Urals	689
<i>Gerasimovskii, V. I., and V. I. Lebedev.</i> Proportions of strontium and calcium in rocks of the Lovozero massif	699
<i>Pavlenko, A. S., E. E. Vainshtein, and M. M. Kakhana.</i> On Nb/Ta ratios in some minerals from igneous and metasomatic rocks	706
<i>Demin, A. M., and D. N. Khitarov.</i> Geochemistry of potassium, rubidium, and thallium in application to problems in petrology	721
<i>Borisenko, L. F., and N. V. Lisunov.</i> The distribution of scandium and niobium in wolframites	735
<i>Gershoig, Yu. G.</i> The geochemistry of phosphorus in the Krivoi Rog iron ore formation	741
<i>Timofeev, G. I.</i> The distribution of organic material in Bat-Bayos sediments of Dagestan	752
<i>Sazhina, L. I.</i> Relative abundance of rubidium in granites of the USSR	759
<i>Ershov, V. M.</i> The character of the association of germanium with organic constituents of coal	763
Discussion: The age of certain rare-metal granitic intrusions in Central Kazakhstan. <i>G. N. Shcherba and A. I. Ivanov</i>	766
Chronicle: The All-Union Conference on Geochemical and Radiometric Methods of Prospecting and Exploration of Oil and Gas Deposits. <i>A. A. Saukov</i>	771
The Tenth Congress of Mining Engineers and Metallurgists at the Freiberg Mining Academy. <i>A. I. Tugarinov</i>	774

NO. 7

<i>Gerling, E. K., and I. M. Morozova.</i> The kinetics of argon liberation from microcline-perthite	775
<i>Komlev, L. V.</i> Geochronological subdivision of the Precambrian of the Ukraine	782
<i>Kashkarov, L. L., and V. V. Cherdynsev.</i> Neutron emission from minerals and the origin of Ne^{21} in the earth's atmosphere	794
<i>Alekseev, F. A., V. I. Ermakov, and V. A. Filonov.</i> Radioactive elements in oil field waters	806
<i>Leonova, L. L., and L. V. Tauson.</i> The distribution of uranium in the minerals of Caledonian granitoids of the Susamyr batholith	815
<i>Barsukov, V. L.</i> Boron isomorphism in silicates	827
<i>Nesterova, Yu. S.</i> The chemical composition of galena	835

Notes

<i>Khitarov, N. I., and S. D. Malinin.</i> Phase equilibria in the system $\text{H}_2\text{O}-\text{CO}_2$. .	846
<i>Baranov, V. I., and V. K. Khrustianov.</i> Boron profiles by the neutron method.	849
<i>Vishnevsky, A. S.</i> New data on the distribution of indium in minerals of the oxidized zone	851

<i>Tovarova, I. I.</i> Removal of water-soluble substances from the pyroclastic rocks of the volcano Bezymyannyi	856
Chronicle	
Tenth General Assembly of the International Astronomical Union	
1. Symposium on the Evolution of Meteoritic Matter. <i>A. A. Yavnel</i>	861
2. Symposium on the Origin of the Earth and Planets. <i>B. Yu. Levin</i>	864

NO. 8

<i>Gerling, E. K., and A. A. Polkanov.</i> The absolute age determination of the Precambrian of the Baltic Shield	867
<i>Polevaya, N. I., N. E. Titov, V. S. Belyaev, and V. D. Sprintsson.</i> Application of the Ca method in the absolute age determination of sylvites	897
<i>Petrovskaya, N. V., L. N. Grinenko, and M. S. Chupakhin.</i> Application of sulfur isotope analysis in the study of the Uchala (South Urals) copper pyrites	907
<i>Tauson, L. V.</i> Effect of mineral structure on the isomorphous replacements in silicates of effusive rocks	917
<i>Gerasimovskii, V. I., A. M. Tuzova, and I. D. Shevaleevskii.</i> The zirconium-hafnium (celtium) ratio in the Lovozero massif rocks	926
<i>Solodov, N. A.</i> Distribution of rare elements in minerals of rare-metal granite pegmatites	932
Index to 1958 Volume; Title Page; Table of Contents of 1958 Volume	941

